

WHAT IS CLAIMED IS:

1. A method of processing a contone image, the method comprising:
using a halftone screen to generate a bi-level bitmap;
partitioning the contone image into an array of image blocks;
halftoning the image blocks;
using the bi-level bitmap to select some of the halftone image blocks; and
modifying the selected halftone image blocks using code words, such that
information contained in the code words is embedded in a halftone image.
2. The method of claim 1, wherein the information is embedded at a coding rate
that is linked to a graylevel of a contone patch, and wherein the bitmap is produced by
halftoning the constant patch of the graylevel.
3. The method of claim 2, wherein the graylevel is determined by the coding rate.
4. The method of claim 1, wherein the bitmap is selected from a predetermined
table of bi-level bitmaps.
5. The method of claim 1, wherein unselected image blocks are of one dimension
and the modified image blocks are of a different dimension.
6. The method of claim 1, wherein a graphical bar code is embedded in the
halftone image.
7. The method of claim 1, wherein the use of the bi-level bit map to select an
image block is bypassed if the image block meets at least one requirement.
8. The method of claim 1, wherein the halftoning is error diffusion halftoning.
9. The method of claim 1, wherein error caused by modifying the selected blocks
is diffused.

10. Apparatus for performing the method of claim 1.
11. An article comprising memory encoded with a program for causing a processor to perform the method of claim 1.
12. A method of extracting information embedded in a halftone image, the method comprising:
 - accessing a bi-level bit map ;
 - partitioning the halftone image into a plurality of image blocks;
 - using the bitmap to select at least some of the blocks;
 - identifying a code word sequence in the selected blocks; and
 - extracting the information from the code word sequence.
13. The method of claim 12, wherein the information is extracted at a rate that is linked to a graylevel of the halftone image.
14. The method of claim 12, wherein the bitmap is accessed from a table of different bitmaps.
15. The method of claim 12, wherein accessing the bitmap includes using a gray level parameter as an index into the table.
16. The method of claim 12, wherein an image block meeting certain requirements is automatically discarded prior to the selection.
17. The method of claim 12, further comprising using unselected blocks to reconstruct the image.
18. The method of claim 12, wherein extracting the information includes using probabilistic analysis to produce a set of probability parameters, using the set of probability parameters to select the most likely sequence of image blocks corresponding

to the information image block sequence originally encoded into the image, and converting the most likely sequence of image blocks into the information.

19. Apparatus for performing the method of claim 12.

20. An article comprising memory encoded with a data for causing a processor to perform the method of claim 12.

21. Apparatus comprising one of an encoder for encoding a contone image and a decoder for decoding a halftone image;

the encoder using a halftone screen to generate a halftone bitmap, partitioning the contone image into an array of image blocks, halftoning the image blocks, using the halftone bitmap to select at least some of the image blocks, and modifying the selected halftone image blocks using code words, such that information contained in the code words is embedded in the halftone image;

the decoder accessing a bi-level bit map; partitioning the halftone image into a plurality of second image blocks; using the bitmap to select at least some of the second blocks; identifying a code word sequence in the selected second blocks; and extracting the information from the code word sequence.

22. The apparatus of claim 21, wherein the apparatus includes an encoder for embedding the information at a rate that is linked to a graylevel of a contone patch, and wherein the halftone bitmap is produced by halftoning the constant patch of the graylevel.

23. The apparatus of claim 22, wherein the graylevel is determined by a coding rate.

24. The apparatus claim 21, wherein the apparatus includes an encoder, and wherein unselected image blocks are of one dimension and the modified image blocks are of a different dimension.

25. The apparatus of claim 21, wherein the apparatus includes an encoder that embeds graphical symbols in the halftone image.

26. The apparatus of claim 21, wherein the use of both bit maps is bypassed if the image block meets at least one requirement.
27. The apparatus of claim 21, wherein the apparatus includes a decoder that extracts the information at a rate that is linked to a graylevel of the halftone image.
28. The apparatus of claim 17, wherein the apparatus includes a decoder; and wherein extracting the information includes using probabilistic analysis to produce a set of probability parameters, using the set of probability parameters to select the most likely sequence of image blocks corresponding to the information image block sequence originally encoded into the image, and converting the most likely sequence of image blocks into the information.
29. An article for causing a processor to encode a contone image, the article comprising memory encoded with data for causing the processor to use a halftone screen to generate a bi-level bitmap; partition the contone image into an array of image blocks; halftone the image blocks; use the bi-level bitmap to select some of the halftone image blocks; and modify the selected halftone image blocks using code words, such that information contained in the code words is embedded in a halftone image.
30. The article of claim 29, wherein the the information is embedded at a rate that is linked to a graylevel of a contone patch , and wherein the bi-level bitmap is produced by halftoning the constant patch of the graylevel.
31. The article of claim 30, wherein the graylevel is determined by a coding rate.
32. The article of claim 29, wherein unselected image blocks are of one dimension and the modified image blocks are of a different dimension.
33. The article of claim 29, wherein graphical symbols are added to the halftone image.

34. The article of claim 29, wherein the use of the halftone screen to select an image block is bypassed if the image block meets at least one requirement.

35. An article for causing a processor to extract information from a halftone image, the article comprising memory encoded with data for causing the processor to access a bi-level bit map; partition the halftone image into a plurality of image blocks; use the bitmap to select at least some of the blocks; identify a code word sequence in the selected blocks; and extract the information from the code word sequence.

36. The article of claim 35, wherein the information is extracted at a rate that is linked to a graylevel of the halftone image.

37. The article of claim 35, wherein an image block meeting certain requirements is automatically discarded prior to the selection

38. The article of claim 35, wherein extracting the information from the code word sequence includes using probabilistic analysis to produce a set of probability parameters, using the set of probability parameters to select the most likely sequence of image blocks corresponding to the information image block sequence originally encoded into the image, and converting the most likely sequence of image blocks into the information